WHAT IS CLAIMED IS:

1. A method for interference-resistance using closed-loop transmit diversity (CLTD) at a receiver comprising:

receiving a signal;

computing a CLTD weighting vector from the received signal;

providing the CLTD weighting vector to a transmitter; and

using the CLTD weighting vector to suppress interference.

2. The method of claim 1, wherein the using produces an estimate of the signal transmitted by the transmitter.

3. The method of claim 1, wherein the computing of the CLTD weighting vector comprises:

calculating a channel estimate from the received signal; and

computing the CLTD weighting vector based on the channel estimate.

4. The method of claim 1, wherein there are multiple users, and wherein the using comprises using the CLTD weighting vector, a channel estimate, and spreading codes for each user.

5. The method of claim 4, wherein when using a zero-forcing function, estimates for the signal may be expressed as:

$$y_{ZF} = (A^H A)^{-1} A^H r, N_C Q \geq M,$$

where r is the received signal, A is defined as $H\tilde{W}[\sqrt{\rho_1} C_1 \quad \sqrt{\rho_2} C_2 \quad \cdots \quad \sqrt{\rho_M} C_M]$, H is the channel estimate, *Nc* is the spreading gain, *Q* is the number of received antennas, *M* is the

number of multiple users, $\tilde{W}$ is the weighting vector, $\sqrt{\rho_i}$ is the i-th power source, and *Ci* is the i-th spreading code.

6. The method of claim 5, wherein the computation of the estimates for the signal can be implemented using a parallel or serial interference cancellation technique.

7. The method of claim 4, wherein when using a minimum mean-square error function, estimates for the signal may be expressed as:

$$y_{MMSE} = (A^H A + \sigma^2 \Lambda^{-1})^{-1} A^H r = \Lambda A^H (A \Lambda A^H + \sigma^2 I_{NN_cQ})^{-1} r,$$

where r is the received signal, A is defined as $H\tilde{W}[\sqrt{\rho_1}C_1 \quad \sqrt{\rho_2}C_2 \quad \cdots \quad \sqrt{\rho_M}C_M]$, H is the channel estimate, *Nc* is the spreading gain, *Q* is the number of received antennas, *M* is the number of multiple users, $\tilde{W}$ is the weighting vector, ρ_i is the i-th power source, $\Lambda = E[dd^H]$, I is the identity matrix, and *Ci* is the i-th spreading code.

8. The method of claim 7, wherein the computation of the estimates for the signal can be implemented using a parallel or serial interference cancellation technique.

9. The method of claim 1 wherein the using comprises:

equalizing the received signal; and

despreading the equalized received signal.

10. The method of claim 9, wherein there are multiple users, and wherein the despreading applies spreading codes from each user to the equalized received signal.

11. The method of claim 9, wherein the equalizing applies the CLTD weighting vector and a channel estimate to the received signal.

12. The method of claim 9, wherein when using a zero-forcing function, estimates for the signal may be expressed as:

$$z_{ZF} = (\tilde{W}^H H^H H \tilde{W})^{-1} \tilde{W}^H H^H r,$$

where r is the received signal, H is the channel estimate, and $\tilde{W}$ is the weighting vector.

13. The method of claim 9, wherein, when using a minimum mean-square error function, estimates for the signal may be expressed as:

$$z_{MMSE} = (W^H H^H H \tilde{W} + (\sigma^2 / \mu) I_{NN_C})^{-1} \tilde{W}^H H^H R$$

$$= \tilde{W}^H H^H (H \tilde{W} \tilde{W}^H H^H + (\sigma^2 / \mu) I_{NN_C Q})^{-1} r,$$

where $\mu = \frac{1}{N_c} \sum_{k=1}^{M} \rho_k \varepsilon_k$, $\varepsilon_k = E[|d_k(n)|^2]$, r is the received signal, H is the channel estimate, $\tilde{W}$ is the weighting vector, and I is the identity matrix.

14. The method of claim 9, wherein an equalizer to perform the equalization can be implemented as a bank of P*Q filters, wherein P is the number of transmit antennas and Q is the number of receive antennas.

15. The method of claim 1 wherein the using comprises:

equalizing the received signal;

despreading the equalized received signal; and

coherent combining the despread equalized received signal.

16. The method of claim 15, wherein the equalizing applies a channel estimate to the received signal.

17. The method of claim 16, wherein, when using a zero-forcing function, estimates for the signal may be expressed as:

$$z_{ZF} = (H^H H)^{-1} H^H r, \quad Q \geq P$$

where r is the received signal, H is the channel estimate, and Q is the number of received antennas.

18. The method of claim 16, wherein, when using a minimum mean-square error function, estimates for the signal may be expressed as:

$$z_{MMSE} = (H^H H + (\sigma^2 / \mu) I_{NN_cP})^{-1} H^H r$$

$$= H^H (HH^H + (\sigma^2 / \mu) I_{NN_cQ})^{-1} r$$

where $\mu = \frac{1}{N_c} \sum_{k=1}^{M} \rho_k \varepsilon_k$, $\varepsilon_k = E[|d_k(n)|^2]$, r is the received signal, H is the channel estimate, and Q is the number of received antennas, ρ_i is the i-th power source.

19. The method of claim 15, wherein there are multiple users, and wherein the despreading applies spreading codes from each user to the equalized received signal.

20. The method of claim 19, wherein the despreading produces a symbol stream for each user.

21. The method of claim 15, wherein the coherent combining applies the CLTD weighting vector to despread symbol intervals.

22. The method of claim 21, wherein there are multiple users, and wherein the coherent combining further applies the channel estimate and spreading codes from each user.

23. The method of claim 15, wherein an equalizer to perform the equalization can be implemented as a bank of P*Q filters, wherein P is the number of transmit antennas and Q is the number of receive antennas.

24. A method for interference-resistance using closed-loop transmit diversity (CLTD) comprising:

at a receiver

receiving a signal;

computing a CLTD weighting vector from the received signal;

providing the CLTD weighting vector to a transmitter;

using the CLTD weighting vector to suppress interference;

the method further comprising at a transmitter

transmitting a signal;

receiving the CLTD weighting vector; and

applying the CLTD weighting vector to subsequent transmissions.

25. The method of claim 24, wherein the using produces an estimate of the signal transmitted by the transmitter.

26. The method of claim 24, wherein the computing of the CLTD weighting vector comprises:

calculating a channel estimate from the received signal; and

computing the CLTD weighting vector based on the channel estimate.

27. The method of claim 24, wherein there are multiple users, and wherein the using comprises using the CLTD weighting vector, a channel estimate, and spreading codes for each user.

28. The method of claim 24 wherein the using comprises:

equalizing the received signal; and

despreading the equalized received signal.

29. The method of claim 24 wherein the using comprises:

equalizing the received signal;

despreading the equalized received signal; and

coherent combining the despread equalized received signal.

30. A receiver comprising:

a channel estimation unit coupled to a signal input, the channel estimation unit containing circuitry to calculate an estimate of a communications channel;

a weighting vector unit coupled to the channel estimation unit, the weighting vector unit containing circuitry to compute a weighting vector from the estimate of the communications channel;

a feedback unit coupled to the weighting vector unit, the feedback unit to provide the estimate of the communications channel back to a source of a received signal provided by the signal input; and

an interference resistant detection unit coupled to the signal input, the interference resistant detection unit containing circuitry to use the estimate of the communications channel and the weighting vector to improve interference resistance of the receiver.

31. The receiver of claim 30, wherein the interference resistance detection unit further uses known spreading codes of the received signal to improve the interference resistance of the receiver.

32. The receiver of claim 31, wherein the receiver receives signals from a plurality of users, and wherein the known spreading codes can be used to separate signals from each of the plurality of users from the received signal.

33. The receiver of claim 31, wherein the interference resistant detection unit first equalizes the received signal and then despreads the equalized received signal.

34. The receiver of claim 31, wherein the interference resistant detection unit first equalizes the received signal, then despreads the equalized received signal, and then coherently combines the despread received signal.

35. A communications system comprising:

a transmitter coupled to a data source, the transmitter containing circuitry to encode and spread a data stream provided by the data source and to transmit the encoded and spread data stream;

a communications channel coupled to the transmitter, the communications channel to carry the transmitted encoded and spread data stream;

a receiver coupled to the communications channel, the receiver comprising

a channel estimation unit coupled to a signal input, the channel estimation unit containing circuitry to calculate an estimate of a communications channel;

a weighting vector unit coupled to the channel estimation unit, the weighting vector unit containing circuitry to compute a weighting vector from the estimate of the communications channel;

a feedback unit coupled to the weighting vector unit, the feedback unit to provide the estimate of the communications channel back to a source of a received signal provided by the signal input; and

an interference resistant detection unit coupled to the signal input, the interference resistant detection unit containing circuitry to use the estimate of the communications channel and the weighting vector to improve interference resistance of the receiver.

36. The communications system of claim 35, wherein the communications channel is a wireless communications channel.

37. The communications system of claim 36, wherein the communications system is a code-division multiple access (CDMA) communications system.

38. The communications system of claim 36, wherein the transmitter transmits the encoded and spread data stream over multiple antennas.